ENDOCRINE, METABOLISM, NUTRITION AND REPRODUCTIVE SCIENCES (EMNR) INTEGRATED REVIEW GROUP

Overall Description

The Endocrine, Metabolism, Nutrition and Reproductive Sciences (EMNR) IRG reviews themes surrounding molecular, cellular and higher order regulatory processes in physiology and pathophysiology. EMNR will evaluate applications on basic and clinical aspects of hypothalamic, pituitary, gonadal, thyroid and adrenal physiology and pathophysiology, diabetes mellitus including its pathogenesis, complications and treatment, the biology of the pancreatic islet (beta cell), obesity including its causes and treatment, adipocyte biology, and other metabolic disorders including inborn errors of metabolism and nutrient transport disorders. Applications addressing the biology of reproduction and the pathobiology of its disorders, including the causes and treatments of male and female infertility, male and female reproductive aging and menopause, and of obstetrical disorders of implantation, gestation, embryogenesis, parturition, fetal and neonatal life, and gynecologic conditions, including disorders of the pelvic floor, will be reviewed in this IRG. The role of nutrition in normal physiology, and in all of these pathological conditions will also be reviewed in this IRG.

This IRG will also review applications involving integrative physiology and pathophysiology such as neuroendocrinology, humoral actions of the gut, lung and heart, humoral aspects of cancer pathogenesis and therapy, especially cancers of the breast, reproductive tract including the uterus and prostate, adrenal and thyroid, as well as studies related to the effects of drugs, biopharmaceuticals, alcohol and toxicants, xeno- and endobiotics, and their mechanisms of action. Investigators may employ a broad range of basic and clinical research methods and techniques, including pharmacologic, chemical and biochemical approaches, genetics, genomics and proteomics, molecular and cell biology techniques, animal models, and patient oriented studies including large population studies and randomized clinical trials involving all of the research venues mentioned above.

Study sections in this IRG include:

Molecular and Cellular Endocrinology (MCE)
Integrative and Clinical Endocrinology (ICE)
Cellular, Molecular and Integrative Reproduction (CMIR)
Pregnancy, Neonatology and Lactation (PNL)
Cellular Aspects of Diabetes and Obesity (CADO)
Integrative Physiology of Obesity and Diabetes (IPOD)
Integrative Nutrition and Metabolic Processes (INMP)

MOLECULAR AND CELLULAR ENDOCRINOLOGY STUDY SECTION (MCE)

Molecular and Cellular Endocrinology Study Section (MCE) reviews applications to investigate synthesis and secretion of local and circulating hormones and growth factors that include but are not limited to polypeptides and lipid-based ligands and their mechanisms of signaling as they interact with cell surface and nuclear receptors to influence cell structure, function, and the regulation of gene expression in both normal and pathological states.

Specific areas covered by MCE

- Polypeptide hormone synthesis, processing, secretion, and trafficking
- Steroidogenesis
- Membrane receptors and transmembrane signaling
- Hormone binding proteins
- Nuclear receptor superfamily
- Polypeptide hormone, steroid hormone, xenobiotic and endobiotic action
- Intracellular signal transduction
- Hormonal and growth factor regulation of gene expression including DNA-binding proteins, coactivators, corepressors, and all other modulators of transcription
- Hormonal and growth factor regulation of cell growth and differentiation
- Structure/function relationships of hormone receptors
- Molecular basis of endocrine and hormone-dependent cancer
- Functional analysis of genomic and proteomic patterns of hormone action

Shared Interests within the EMNR IRG

- Integrative and Clinical Endocrinology (ICE): There are shared interests with the ICE on effects of hormones on growth and developmental disorders, and key components of the hypothalamic-pituitary end-organ axis. Shared interest also occurs in the area of endocrine and hormone-dependent cancers. While ICE focuses on physiological processes and potential clinical trials, MCE addresses the mechanistic bases of these physiological changes.

- Cellular, Molecular and Integrative Reproduction (CMIR): CMIR focuses on reproductive organ physiology and pathobiology. This study section also reviews projects that link molecular mechanism with physiological outcomes. Reproductive studies that focus on hormone action independent of a physiological setting would be better suited for MCE.

- Cellular Aspects of Diabetes and Obesity (CADO) and Integrative Physiology of Obesity and Diabetes (IPOD): Factors which affect adipocyte differentiation and biology are typically assigned to CADO or IPOD. Some of these factors can be endocrine products that regulate gene expression. Studies that focus on the mechanism of action of endocrine agents and only secondarily consider adipocyte differentiation and biology are better suited for MCE. Conversely, when the regulation of gene expression by endocrine agents is secondary to their impact on adipocyte differentiation, assignment may be made to CADO or IPOD. Factors that affect neural mechanism of satiety and feeding may be assigned to CADO or IPOD except when basic concepts of signal integration are involved. These would be of interest to MCE.

- Integrative Nutrition and Metabolic Processes (INMP): When applications focus on nutrient regulation of gene expression, the review may often be handled by the INMP study section. When the nutrient acts through components of the endocrine system and the focus is on their role, assignment may be made to MCE.

- All Study Sections in EMNR IRG: Leptin effects on other endocrine systems may be covered in other study sections within the EMNR IRG as appropriate. The mechanism by which leptin interacts with signaling cascades can be assigned to MCE.

Shared Interest outside of the IRG:

Studies that address the biology of endocrine organs and their products, both hormones and growth factors, maybe considered in this section.

- IRG 1(Biological Chemistry and Macromolecular Biophysics IRG): Shared interest exists with protein structure, folding, and structure activity relationships. These types of studies, when focused on hormones, growth factors, their receptors, and proteins directly linked to signaling and trafficking pathways can be assigned to MCE. In contrast, when hormones, growth factors, and their receptors receive only secondary emphasis, assignment to IRG 1 may be more appropriate.

- IRG 2 (Molecular Approaches to Gene Function IRG): Shared interests exist with regulatory mechanisms of gene expression as well as chromatin structure and dynamics. Projects that consider these topics and focus on hormones, their cognate receptors and co-regulators, and their target genes may be assigned to MCE.

- IRG 3 (Molecular Approaches to Cell Function and Interactions IRG): Shared interests exist between intra-and intercellular signaling; cell cycle control; apoptosis; cell junctions, and extracellular matrix. Projects that encompass these areas and that focus on hormones and growth factors and their sources may be assigned to MCE.

- IRG 5 (Biology of Development and Aging): Applications addressing endocrinology of aging that focus on mechanisms of aging, such as oxidative stress, DNA damage, cellular senescence, could be assigned to IRG 5 when the study transcends single organ systems or disciplines.

INTEGRATIVE AND CLINICAL ENDOCRINOLOGY STUDY SECTION (ICE)

Integrative and Clinical Endocrinology Study Section (ICE) reviews applications that focus on the physiology and pathophysiology of general endocrine (other than reproductive) systems, and clinical endocrine investigation. Areas of interest also include adaptation and response to environmental stress and homeostatic challenge, genetics and genomics, growth, development, aging, cancer, interactions with the cardiovascular, gastrointestinal and immune systems, endocrine disruptors/xenobiotics, pharmacology, novel hormone-based therapies and comparative endocrinology.

Specific Areas Covered by ICE:

- Pituitary, thyroid, and adrenal physiology and pathophysiology
- Growth, development and disorders of endocrine organs and their products
- Neuroendocrinology

- Hormonal and growth factor-related neoplasia
- Hormones and the cardiovascular system
- Hormones and immunobiology
- Endocrinology of aging
- Hormones and the gut
- Endocrine pharmacology and toxicology, including endocrine disrupters and xenobiotics
- Hormones, stress, and the autonomic system
- Hormone-based therapies
- Comparative endocrinology
- Animal models of endocrine disorders

Shared Interests within the IRG:

- Molecular and Cellular Endocrinology (MCE): There are shared interests with MCE on effects of hormones on growth and developmental disorders, and key components of the hypothalamic-pituitary end-organ axis. Shared interest also occurs in the area of endocrine and hormone-dependent cancers. While MCE addresses the mechanistic basis of these physiological changes, ICE focuses on physiological processes and potential clinical trials.

- Cellular, Molecular and Integrative Reproduction (CMIR): CMIR focuses on reproductive organ physiology and pathobiology. CMIR also reviews projects that link molecular mechanism with physiological outcomes. Studies that focus on physiological contributions made by the hypothalamus and pituitary may be better suited for ICE. Conversely, studies that include contributions from the hypothalamus and pituitary but emphasize targets in the gonads or reproductive tract could be assigned to CMIR. Other areas of common interest include hormones and aging as related to the menopause, endocrine disruptors that affect reproductive function, growth and development including neonatal biology, and hormonal therapies, including hormonal replacement.

- Cellular Aspects of Diabetes and Obesity (CADO) and Integrative Physiology of Obesity and Diabetes (IPOD): Factors which affect the physiology and pathophysiology of diabetes and obesity could be assigned to CADO or IPOD except when the focus is primarily on reproduction such as may occur in some studies of disorders such as PCOS. Other areas of shared interest with CADO or IPOD include endocrine/immune interactions, hormones and aging, regulation of the autonomic nervous system, and neuroendocrinology related to satiety and glucose metabolism. When these areas target the reproductive system, they could be assigned to CMIR.

Shared Interest outside of the IRG:

- IRG 5 (Biology of Development and Aging IRG): Shared interest exists for age-dependent endocrine physiology and pharmacology. Basic or clinical studies of age-related changes involving the endocrine system may be assigned to ICE. In contrast studies focused on multiple physiologic systems or life-span extension or caloric restriction could be assigned to BDA.

- IRG 10 (Immunology IRG): Basic and clinical studies on autoimmunity and inflammation as related to endocrine disorders including diabetes, thyroid, adrenal, and other non-gonadal glands may be assigned to ICE. In contrast, studies focus on fundamental aspects of immunochemistry and genetics, and cellular, molecular,

developmental immunology could be assigned to the IRG 10 (or to CMIR or PNL in the EMNR IRG if emphasis is placed on the gonads or reproductive tract).

- IRG 13 (Oncological Sciences IRG): Shared interest exists for the role of hormones in the etiology, pathogenesis, promotion, prevention, and treatment of cancer. Shared interest also exists for endocrine cancers such as pituitary, thyroid, and other endocrine glands. When the primary focus of basic or clinical studies is on the role of hormones, or endocrine organs assignment may be made to ICE. In contrast, proposals that focus on the biology and clinical aspects of cancer, where hormones receive a secondary consideration, are better suited to IRG 13.

- IRG 15 (Cardiovascular Sciences IRG): Shared interest exists for hormones and vascular biology, cardiac physiology, hypertension, and peripheral vascular disorders. Basic or clinical studies that focus primarily on the role of hormones may be assigned to ICE. In contrast, if the role of hormones is secondary to the project focus, assignment could be made to IRG 15.

- IRG 18 (Digestive Sciences IRG): Shared interest exists for metabolism, pharmacology and toxicology of nutrients, xenobiotics, and endocrine disruptors. Basic or clinical studies that place a major emphasis on nutrients, xenobiotics, and endocrine disruptors and their action on endocrine systems may be assigned to ICE. When interactions with the endocrine system are not the primary focus, assignment could be made to IRG 18.

- IRG 22 (Molecular, Cellular and Developmental Neuroscience IRG): Projects which focus on hormone actions in the brain, such as estrogens, and adrenal corticosteroids and other endocrine agents may be assigned to ICE. When the focus is on regulation of synaptic plasticity and other aspects of neuronal biology, assignment to MCDN may be more appropriate.

- IRG 23 (Integrative, Functional and Cognitive Neurosciences IRG): Projects that focus on hypothalamic-pituitary interactions as they relate to feedback regulation of peripheral endocrine organs, including the adrenal and thyroid axis may be assigned to ICE. When the focus is on other neuronal interactions, assignment to IFCN could occur.

CELLULAR, MOLECULAR AND INTEGRATIVE REPRODUCTION (CMIR)

The Cellular, Molecular and Integrative Reproduction (CMIR) study section reviews applications based on molecular, cellular, systems, and integrative biology. This field encompasses the biology of germ cells and gametes, early events in conception, including research relevant to the assisted reproductive technologies, and embryo development, including embryonic stem cells, up until the stage of implantation. This field would also include the neuroendocrine control of reproductive processes, gonadal function, puberty, male and female reproductive aging, the male and female genital tracts and their disorders, and the clinical areas of infertility, contraception, gynecology andrology, as well as reproductive toxicology.

Specific Areas Covered by CMIR:

- Origin and differentiation of germ cells

- Sex determination of the male and female gonad and genital tracts, including issues relevant to imprinting; also sexual development and maturation
- The endocrine, paracrine and physiologic mechanisms involved in mammalian oogenesis and spermatogenesis, including germ cell-somatic cell interactions, germ cell proliferation and apoptosis, and germ cell transplantation
- Structure, function and regulation of the epididymis
- Fertilization including sperm motility and capacitation, zona pellucida binding, mechanisms to block polyspermy
- Pre-implantation embryonic development including zygotic gene activation, autocrine/paracrine factors and environmental influences on gene expression
- Embryonic stem cell biology including mechanisms regulating stem cell differentiation
- Epigenetic factors in development
- Animal cloning and nuclear reprogramming
- Ovarian and testicular physiology and pathophysiology
- Fundamental and clinical science underlying assisted reproductive technologies including cryobiology
- Reproductive neuroendocrinology including development of the HPG axis, neuropeptides/neurotransmitters related to the control of GnRH, regulation of gonadotropin and prolactin secretion, neuroendocrinology of puberty, feedback mechanisms of steroid and peptide hormones, and mechanisms underlying biorhythms of reproductive hormones
- Clinical and fundamental mechanisms underlying infertility in males and females
- Contraception
- Puberty, male and female reproductive aging, and the menopausal transition
- Male genital tract and its disorders
- Gynecology and andrology
- Female genital tract and its disorders
- Gonadal hormone production, regulation, and action
- The effects of pharmaceuticals, xenobiotics and environmental factors on any aspect of reproduction

Shared Interests within the IRG:

- Pregnancy, Neonatology and Lactation (PNL): There is shared interest in the peri-implantation period. Depending on the emphasis of the applications assignment may be to CMIR or PNL, as appropriate.

- Molecular and Cellular Endocrinology (MCE): MCE focuses on hormone action. There is shared interest on reproductive organ physiology and pathobiology. CMIR may be assigned projects that link molecular mechanisms with physiological outcomes; whereas, reproductive studies that focus on hormone action independent of a physiological setting would be better suited for MCE. MCE also focuses on steroidogenesis. CMIR could be assigned proposals dealing with gonadal steroidogenesis and its regulation.

- Integrative and Clinical Endocrinology (ICE): ICE reviews applications involved with physiology and pathophysiology of general endocrine systems other than reproductive systems. Shared interest occurs in neuroendocrine studies. Applications involving hypothalamic/pituitary/gonadal function, including growth, development and aging of the reproductive system, feed back, and gonadal hormone replacement therapies may be assigned to CMIR.

- Cellular Aspects of Diabetes and Obesity (CADO) and Integrative Physiology of Obesity and Diabetes (IPOD): CADO has shared interests in applications involved with PCOS. Applications that focus on gonadal biology could be assigned to CMIR; whereas, applications involved in insulin action may be assigned to CADO or IPOD.

Shared Interests outside of the IRG:

- IRG 3 (Molecular Approaches to Cell function and Interactions IRG): There are shared interests in areas related to gametogenesis and reproductive tract remodeling. These applications related to reproduction may be assigned to CMIR.

- IRG 5 (Biology of Development and Aging IRG): There is extensive shared interest in the areas of gametogenesis and fertilization; these areas include specifically formation of egg and sperm, fertilization, pre-implantation, animal cloning and organogenesis. Such shared interests can be minimized by referring applications related to this area dealing with mammalian, especially human, systems to CMIR; whereas, all other animals, plants, and model systems may be assigned to the IRG 5. Male and female reproductive aging across and within the H-P-G axis and other reproductive tissues where the focus is on the endocrine system could be assigned to CMIR. If the focus is on mechanisms of aging, such as oxidative stress, DNA damage, or cellular senescence, particularly when the study transcends single organ systems or disciplines, the applications could be assigned to IRG 5. Interactions between the H-P-G axis and non-reproductive physiologic systems could be assigned to IRG 5 if the focus is on aging research.

- IRG 10 (Immunology IRG): There are shared interests in the areas of reproductive immunology, autoimmune ovarian failure, immune infertility, and immuno-contraception. Applications involving basic immune mechanisms could be assigned to IRG10; whereas applications involved in clinical problems of the reproductive tract may be assigned to CMIR.

- IRG 11 (Infections Disease and Microbiology IRG): There is shared interest in genital tract infections related to infertility. Applications that involve damage to the genital tract could be assigned to CMIR.

- IRG 13 (Oncological Sciences IRG): Areas of shared interest include endometrial hyperplasia, prostate neoplasia, mammary neoplasia, pituitary adenomas and germ cell tumors. Applications that involve hormonal alterations in reproductive tissues producing neoplasia may be assigned to CMIR. Applications that focus on malignancy could be assigned to IRG 13.

- IRG 15 (Cardiovascular Sciences IRG): There is shared interest in ovarian angiogenesis and luteal development. Angiogenesis affecting ovarian function may be assigned to CMIR.

- IRG 17 (Musculoskeletal, Oral and Skin Sciences IRG): There are shared interests in the areas of menopause and osteoporosis, uterine tissue/menstruation, ovulation related remodeling and pelvic floor support. Applications whose endpoints are remodeling of reproductive tissues may be assigned to CMIR. Whereas, alterations in non-reproductive tissues could be assigned to IRG 17.

- IRG 20 (Renal and Urological Sciences IRG): There is shared interest in the areas of male infertility, erectile dysfunction, and urinary incontinence. The perspective of the applicant should determine the referral of these proposals.

- IRG 21 (Surgery, Applied Imaging and Bioengineering): There is shared interest in the areas of diagnostic imaging of the reproductive tract and processes. Those studies that relate to reproductive function and tract may be assigned to CMIR. Those studies that focus on pathobiology and physics of imaging could be assigned to IRG 21.

- IRG 22 (Molecular, Cellular and Developmental Neuroscience) and IRG 23 (Integrative Functional and Cognitive Neurosciences): There is shared interest in the areas of development of hypothalamic-pituitary-gonadal axis and its dysfunction, neural regulation of the menstrual cycle, reproductive influences on reproductive behavior and gonadal steroid effects on cognition, mood, behavior and memory. Applications involved with sex determined nervous system differentiation and neural regulation of reproductive function and gonadal feedback may be assigned to CMIR.

- IRG 24 (Brain Disorders and Clinical Neurosciences): There is shared interest in the areas of hormonal influences on neurodegenerative diseases and brain injury. Proposals that deal with effects of neurodegenerative brain injury on reproduction or effects of gonadal steroids on neurological diseases and brain injury may be assigned to CMIR.

PREGNANCY, NEONATOLOGY AND LACTATION STUDY SECTION (PNL)

The Pregnancy, Neonatology and Lactation (PNL) study section deals with all aspects of intrauterine mammalian development from implantation through pregnancy, parturition and the neonatal period. The areas of science include the normal physiology of pregnancy, parturition and the postpartum period as well as clinical obstetrics, disorders of pregnancy, neonatal development and diseases of the newborn. In addition, research related to immunology of pregnancy, maternal nutrition, the effects of pharmaceuticals, xenobiotic agents and environmental toxicants on pregnancy, placental endocrinology and function, lactation and mammary gland physiology will be reviewed. The techniques and/or research models utilized for this research will include clinical and basic genetics, molecular biology, cellular and organ physiology, and integrative biology.

Specific Areas Covered by PNL:

- Trophoblast invasion, maternal-fetal interactions, ectopic pregnancy and its diagnosis and treatment
- Placental development, trophoblast differentiation, placental endocrinology, transport functions and utero-placental blood flow
- Pregnancy and mechanisms leading to parturition (including endocrine, immunologic, infectious, coagulation related issues)
- Disorders of pregnancy (preeclampsia, gestational diabetes and other medical diseases affecting pregnancy)
- Fetal and neonatal biology including fetal growth and development, fetal physiology, fetal diseases, in-utero infection, the transition to extra-uterine life, and neonatal physiology and pathophysiology

- Mammary gland development, maturation and physiology, and the hormonal control of lactation
- Pregnancy immunology including immuno-tolerance mechanisms, the immunologic basis of pregnancy loss and complications, and autoimmune diseases
- The endocrinology of pregnancy as it relates to placental hormone production, endocrine disorders during pregnancy, and fetal endocrinology
- Conditions leading to recurrent pregnancy loss, including factors related to immunology, infection, genetic, structural abnormalities of the reproductive tract
- Pregnancy pharmacology and toxicology, including the effects and metabolism of pharmaceutical agents and xenobiotics, placental transport mechanisms, and pharmacokinetics of drugs in pregnancy
- Nutrition in pregnancy as it relates to maternal physiology, placental function, fetal growth and development and neonatal health
- Sudden infant death syndrome (SIDS) as it relates to pregnancy and neonatal issues.

Shared Interests within the IRG:

- Cellular, Molecular and Integrative Reproduction (CMIR): There is shared interest with respect to uterine biology and the pre-implantation period. Applications focused on uterine function or biology might be assigned to PNL. Similarly, applications dealing with embryonic development in the pre-implantation period could be assigned to CMIR.

- Cellular Aspects of Diabetes and Obesity (CADO): There is shared interest in the area of diabetes during pregnancy (including IDDM, NIDDM, and gestational diabetes). Those studies which address fundamental aspects of glucose metabolism, glucose homeostasis, glucose utilization, etc. could be reviewed in CADO. In contrast, proposals related to the pathophysiology, diagnosis, management, treatment and outcomes of diabetes during pregnancy could be reviewed in PNL.

- Integrative Physiology of Obesity and Diabetes (IPOD): There is potential shared interest in regard to diabetes during pregnancy. Applications focused on carbohydrate metabolism, insulin secretion, pre and post-natal diabetes and long term diabetic outcomes may be assigned to IPOD. In contrast, applications related to the pathophysiology of diabetes during pregnancy, maternal and fetal outcomes, diagnosis and clinical management of diabetes during pregnancy could be assigned to PNL.

- Integrative Nutrition and Metabolic Processes (INMP): There is shared interest with applications related to nutrient metabolism relative to diabetes in pregnancy. PNL may be assigned studies regarding the impact of diet on pregnancy, pregnancy outcomes, fetal development and growth, and lactation. Whereas, INMP could be assigned studies involving abnormalities of fuel metabolism and fundamental nutrient biology occurring in pregnant females.

- Molecular and Cellular Endocrinology (MCE): There is shared interest with applications dealing with aspects of endocrinology including steroidogenesis and hormone synthesis, secretion and action. Applications dealing with placental function, the production and action of trophoblast hormones as well as actions of hormone on the placenta and fetal tissue may be directed to PNL.

- Integrative and Clinical Endocrinology (ICE): There may be shared interest with applications with respect to endocrine changes in pregnancy. Applications dealing with

endocrine function that directly affect pregnancy outcome or placental and fetal function could be assigned to PNL.

Shared Interests outside of the IRG:

- IRG 3 (Molecular Approaches to Cell Function and Interactions IRG): There is shared interest with areas related to implantation, reproductive tract remodeling, and fetal membranes. Applications that directly relate to pregnancy and reproduction could be assigned to PNL.

- IRG 5 (Biology of Development and Aging IRG): There is extensive shared interest in the area of implantation, placental development and embryonic/fetal development. Applications focused on mammalian pregnancy and reproductive systems may be assigned to PNL, whereas, other animals, plants, and model systems could be assigned to IRG 5.

- IRG 10 (Immunology IRG): There is shared interest in the area of reproductive immunology, immuno-deficiency states in pregnancy, immuno-tolerance of pregnancy. Those applications that directly focus on immune phenomena as they related to pregnancy and pregnancy outcomes may be assigned to PNL.

- IRG 11 (Infections Disease and Microbiology IRG): There is shared interest on the topic of genital tract infections in pregnancy, infection related pre-term labor, postpartum infections, and neonatal sepsis. The areas of infectious disease that directly relate to pregnancy and reproduction could be assigned to PNL.

- IRG 12 (AIDS and Related Research IRG): There is shared interest in the area of vertical transmission of HIV and its therapy during pregnancy. Such shared interest is unavoidable. Those applications specifically addressing pregnancy and its outcome (including vertical transmission and the effects on the neonate) could be adequately addressed in PNL, whereas, if the focus is specifically in the biology of HIV, then the proposals may be assigned to IRG 12.

- IRG 13 (Oncological Sciences IRG): There is shared interest with areas of gestational trophoblast neoplasias. Where such studies are related to placental biology and function, then the assignment could be to PNL. In contrast, where the focus is cancer biology and treatment, IRG 13 may be appropriate.

- IRG 15 (Cardiovascular Sciences IRG): There is shared interest in the areas of hypertensive disorders of pregnancy, (including preeclampsia), maternal cardiac diseases, angiogenesis in placenta and uterine tissues, fetal cardiovascular physiology and pathophysiology. Applications that directly relate to maternal and fetal cardiovascular physiology and disease could be assigned to PNL.

- IRG 18 (Digestive Sciences IRG): There is shared interest in the areas of placental nutrient transport and fetal growth. Applications specifically related to placental function and fetal nutrition could be assigned to PNL.

- IRG 20 (Renal and Urological Sciences IRG): There is shared interest in the area of developmental abnormalities in fetal renal tract development, maternal renal diseases and hypertensive disorders of pregnancy. Those applications specifically addressing the fetus and pregnant female may be assigned to PNL, whereas, if the focus were specifically in

the fundamental biology of renal and urological diseases, IRG 20 could be the appropriate assignment.

- IRG 21 (Surgery, Applied Imaging and Bioengineering IRG): There is shared interest in the area of fetal and maternal reproductive tract diagnostic imaging. Applications related to fetal and maternal imaging, and its clinical application could be appropriately reviewed in PNL. In contrast, IRG 21 may be assigned applications addressing the biology and physics of imaging modalities, and its cellular and tissue effects.

- IRG 22 (Molecular, Cellular and Developmental Neuroscience IRG): There is shared interest in the areas of fetal brain development, hypoxic encephalopathy and fetal brain function. These are obvious and unavoidable areas of shared interest. Applications dealing with these areas as they relate to pregnancy outcome and neonatal health could be reviewed in PNL, whereas, IRG 22 may be assigned applications addressing brain development and function.

CELLULAR ASPECTS OF DIABETES AND OBESITY (CADO) STUDY SECTION

The Cellular Aspects of Diabetes and Obesity (CADO) study section includes all aspects of metabolic regulation related to obesity and type 1 and type 2 diabetes, including islet biology, insulin secretion and action; signal transduction pathways and their regulation; regulation of nutrient flux and metabolism in muscle, adipose tissue, liver, and islets; adipocyte biology; cellular metabolism and energy balance. The CADO and IPOD study sections are discrete, but clearly share conceptual and methodological interests. In general, applications that address more cellular and molecular aspects of metabolic regulation and ones that incorporate animal models to validate cellular and molecular hypotheses may be assigned to CADO. Similarly, applications focusing on human or animal models to validate hypotheses related directly to human pathophysiology could be assigned to IPOD.

Specific Areas Covered by CADO:

- Cellular and molecular mechanisms regulating fuel homeostasis and the pathogenesis of obesity and diabetes, including glucose and amino acid transport and metabolism; protein synthesis and degradation; fatty acid synthesis and transport; lipogenesis and lipolysis; glycogen synthesis and gluconeogenesis; insulin action on glucose transport and metabolism, cell differentiation and proliferation, and growth and survival
- Differentiation, development, growth and function of pancreatic islets; beta cell replacement; stem cell biology
- Biosynthesis, trafficking and secretion of insulin and other islet hormones and novel factors that coordinate central and peripheral communication of nutrient status
- Mechanisms of regulation of insulin secretion by metabolites, ion fluxes, signal transduction, and autonomic and neuroendocrine pathways
- Structure and function of ligands, receptors, and other molecules involved in metabolic regulation and energy homeostasis (in the CNS and peripheral tissues)
- Mechanisms of insulin signaling, insulin resistance, and glucose transport
- Downstream signaling pathways in insulin action, including scaffold proteins, phospholipids, kinases and phosphatases
- Modulation of insulin action by cytokines and altered nutritional and metabolic states

- Hypothalamic regulation of energy homeostasis including metabolic substrates, endocrine, neuroendocrine and cytokine mediated-mechanisms
- Differentiation and function of adipocytes, including signal transduction mechanisms that control adipose gene expression and cellular function; structure and function of adipocyte-secreted, biologically active molecules

Shared Interests within the IRG:

- Integrative Physiology of Obesity and Diabetes (IPOD): Applications focusing on the actions of insulin and other hormones influencing energy homeostasis in the whole organism may be directed to IPOD study section.

- Molecular and Cellular Endocrinology (MCE): Applications on basic molecular aspects of signal transduction might appropriately be assigned to CADO when they focus on aspects of metabolic regulation, beta cell function, adipocyte differentiation, or cross-talk with insulin signaling mechanisms.

- Integrative Physiology of Obesity and Diabetes (IPOD) and Cellular, Molecular and Integrative Reproduction (CMIR): The study of PCOS overlaps with ovarian dysfunction. When the application is focused on gonadal biology assignment could be to CMIR: insulin action may be assigned to IPOD. The application could be assigned to CADO when the focus is the cellular and molecular basis of insulin/IGF signaling and insulin resistance in PCOS. Applications integrating whole body insulin resistance and PCOS, especially in humans, may be assigned to IPOD.

- Pregnancy, Neonatology and Lactation (PNL): An application may be assigned to PNL if it focuses primarily on placental biology, pregnancy complications, or immediate fetal and maternal outcomes. If it focuses on carbohydrate metabolism, insulin secretion or long-term diabetes outcomes it could be assigned to either IPOD or CADO.

- Molecular and Cellular Endocrinology (MCE): Polypeptide hormone synthesis, secretion, and trafficking are areas of shared interest with MCE. If the primary focus is islet or adipocyte hormone secretion, applications could be assigned to CADO or possibly IPOD.

- Integrative Nutrition and Metabolic Processes (INMP): Applications focusing on lipoproteins, lipid metabolism and macro and microvascular diabetic complications could be assigned to the INMP.

Shared Interests outside of the IRG:

- IRG 4 (Fundamental Genetics and Population Biology IRG): Genetics of obesity and diabetes may be areas of shared interest with IRG 4. Models of the complex genetics and mapping in animal models or humans could be assigned to IRG 4. Analysis of the functional consequences of specific genetic alterations may be assigned to IPOD or CADO. Genomic approaches to the molecular physiology of obesity and/or diabetes should be assigned in a manner consistent with the main focus of the application. If genomic tools (DNA or protein microarrays, high throughput sequencing, SNP detection, bioinformatics) are used primarily to elucidate direct questions regarding the physiololgy/pathogenesis of these states, the application could be assigned to IPOD or

CADO. If a major or primary focus is on development of genomic techniques/materials for the study of these phenotypes, the application may be assigned to IRG 4.

- IRG 5 (Biology of Development and Aging IRG): Applications involving diabetes and/or obesity as part of aggregate phenotypes related to processes such as aging could be assigned to other suitable IRGs such as IRG 5. Applications addressing modulation of organism longevity and aging processes through the insulin/IGF signaling pathway could be reviewed in IRG 5 when the study transcends single organ systems or disciplines. The special expertise of CADO in the insulin/IGF signaling system provides an appropriate venue for review of applications focusing on the molecular regulation of age-dependent changes in cellular and tissue function.

- IRG 7 (Health of the Population IRG): Effects of behavior on obesity, energy expenditure and food intake may be areas of shared interest with IRG 7. Behavior modification directed toward the prevention or treatment of diabetes or obesity could be assigned to IPOD. Applications in which the primary outcome is evaluation of behavior itself may be assigned to IRG 7. Population studies related to epidemiology or large scale interventions for obesity or diabetes may generally be assigned to IRG 7.

- IRG 10 (Immunology IRG): Applications on autoimmune aspects of Type 1 diabetes that focus primarily on immunity could be assigned to IRG 10. When the experimental focus is on effects of autoimmunity on beta cell function assignment may be to CADO.

- IRG 13 (Oncological Sciences IRG): Applications focusing on obesity or insulin resistance as a risk factor for cancer is an area of shared interest with IRG 13. If the primary focus is the molecular mechanism of oncogenesis the application could be assigned to IRG 13. If the focus is on mechanisms related to metabolic fuel homeostasis, glucose homeostasis or insulin action on cell growth, it may be assigned to CADO or IPOD. Applications that explore the relationship between insulin/IGF signaling and cancer of endocrine or neuroendocrine tissues might be assigned to CADO.

- IRG 15 (Cardiovascular Sciences IRG): In general, applications focusing on the biology or pathogenesis of obesity could be assigned to CADO or IPOD. Applications focusing on the cardiovascular effects of obesity, e.g., LVH or end stage arterial disease may be assigned to IRG 15. Studies of the molecular bases for large vessel complications of diabetes should generally be reviewed in CADO or IPOD.

- IRG 18 (Digestive Sciences IRG): Applications focusing on GI hormones may be an area of shared interest with IRG 18. Applications that focus on gut-mediated effects on feeding, satiety, energy expenditure and islet hormone secretion could be assigned to IPOD or CADO.

- IRG 22 (Molecular, Cellular and Developmental Neuroscience IRG): Applications using hypothalamic neuroanatomy, neurochemistry and neurophysiology applications with a central focus on metabolic homeostasis are areas of shared interest with IRG 22 and could be assigned to IPOD or CADO when end points relate primarily to cellular or systemic metabolic phenotypes.

Integrative Physiology of Obesity and Diabetes Study Section (IPOD)

The Integrative Physiology of Obesity and Diabetes (IPOD) study section reviews applications relating to all aspects of fuel (energy) homeostasis and its regulation, including communication between cells and tissues, the regulation of fuel (energy) flux and storage between tissues and organs, and macronutrients related to energy metabolism and diabetes. Patient oriented research and the use of animal models to explore hypotheses derived from human studies are included within the purview of this study section.

Specific Areas Covered by IPOD:

- Pathogenesis of obesity and diabetes - Genetics including MODY, type 1 or 2 diabetes, mitochondrial genes and genes affecting energy homeostasis and obesity. Metabolic regulation of glucose, fat and protein metabolism and homeostasis related to the pathogenesis of obesity and diabetes. Effects of dietary glucose, fat, and protein and their excesses on the production, secretion and action of hormones (including insulin) and cytokines (including leptin) mediating energy and glucose homeostasis
- Systemic regulation of insulin secretion and insulin action in liver, muscle and fat
- Systemic actions of other hormones and cytokines including leptin when the central experimental focus is insulin action or energy homeostasis
- Energy expenditure, thermogenesis, physical activity, and exercise in the context of obesity pathogenesis or treatment
- Body composition and the mechanisms for, and metabolic consequences of, anatomic patterns of adipose tissue distribution
- Skeletal muscle biology relating to fuel metabolism, energy expenditure, myocyte lipid accumulation and possible secretory functions
- Central nervous system regulation of energy intake, expenditure and nutrient partitioning; glucose and other nutrient sensing mechanisms
- Glucose and other nutrient sensing mechanisms
- Central nervous system effects and autonomic physiology related to energy metabolism on islet function and insulin action
- Hypoglycemia and counter regulatory mechanisms
- Adipocyte functions including nutrient storage and release, and communication with other tissues and organs
- Prevention and treatment of obesity and diabetes

Shared Interests within the IRG:

- Cellular Aspects of Diabetes and Obesity (CADO): Applications focusing primarily on the cellular and molecular mechanisms of the actions of insulin and related hormones may be directed to CADO.

- Cellular Aspects of Diabetes and Obesity (CADO) and Cellular, Molecular and Integrative Reproduction (CMIR): The study of the molecular physiology of PCOS overlaps with ovarian dysfunction. When the application is focused on gonadal biology assignment could be to CMIR: applications that focus on insulin action and other aspects of relevant intermediary metabolism may be assigned to IPOD. The application could be assigned to CADO when the focus of the application is on aspects of insulin/IGF signaling and insulin resistance.

- Pregnancy, Neonatology and Lactation (PNL): Applications may be assigned to PNL if they focus primarily on placental biology, pregnancy complications, or immediate fetal

and maternal outcomes. Applications focusing on carbohydrate metabolism, insulin secretion or long-term diabetes outcomes could be assigned to either IPOD or CADO.

- Molecular and Cellular Endocrinology (MCE): Polypeptide hormone synthesis, secretion, and trafficking are areas of shared interest with MCE. If the primary focus is islet or adipocyte hormone secretion, in the context of obesity or diabetes applications could be assigned to CADO or IPOD.

- Integrative Nutrition and Metabolic Processes (INMP): Applications focusing on lipoproteins, lipid metabolism and macro and microvascular diabetic complications may be assigned to the INMP.

Shared Interests outside of the IRG:

- IRG 4 (Fundamental Genetics and Population Biology IRG): Genetics of obesity and diabetes may be areas of shared interest with IRG 4. Models of the complex genetics and mapping in animal models or humans could be assigned to IRG 4. Analysis of the functional consequences of specific genetic alterations may be assigned to IPOD or CADO. Genomic approaches to the molecular physiology of obesity and/or diabetes should be assigned in a manner consistent with the main focus of the application. If genomic tools (DNA or protein microarrays, high throughput sequencing, SNP detection, bioinformatics) are used primarily to elucidate direct questions regarding the physiololgy/pathogenesis of these states, the application could be assigned to IPOD or CADO. If a major or primary focus is on development of genomic techniques/materials for the study of these phenotypes, the application may be assigned to IRG 4.

- IRG 5 (Biology of Development and Aging): There may be shared interests with aging research applications. Applications that primarily focus on the pathogenesis and treatment of diabetes and obesity in the elderly may be assigned to CADO or IPOD. IRG 5 may review applications with a primary emphasis on aging issues, i.e., on the role of aging changes or co-morbidity-related factors affecting pathogenesis of diabetes and obesity or responses to treatment in the elderly when the study transcends single organ systems or disciplines. IRG 5 could also review applications that focus on the effects of diabetes and obesity on pathophysiologic processes, clinical outcomes and functional status in the elderly when the study transcends single organ systems or disciplines.

- IRG 7 (Health of the Population IRG): Effects of behavior on obesity, energy expenditure and food intake may be areas of shared interest with IRG 7. Behavior modification directed toward the prevention or treatment of diabetes or obesity could be assigned to IPOD. Applications in which the primary outcome is evaluation of behavior itself may be assigned to IRG 7. Population studies related to demographics or large scale interventions for obesity or diabetes may generally be assigned to IRG 7.

- IRG 10 (Immunology IRG): Applications on autoimmune aspects of Type 1 diabetes that primarily focus on immunity could be assigned to IRG 10. When the focus is on effects of autoimmunity on beta cell function assignment may be to CADO.

- IRG 13 (Oncological Sciences IRG): Applications focusing on obesity or insulin resistance as a risk factor for cancer is an area of shared interest with IRG 13. If the primary focus is the molecular mechanism of oncogenesis the application could be assigned to IRG 13. If the focus is on mechanisms related to metabolic fuel homeostasis,

glucose homeostasis or insulin action on cell growth, it may be assigned to CADO or IPOD.

- IRG 15 (Cardiovascular Sciences IRG): In general, applications focusing on the biology or pathogenesis of obesity could come to CADO or IPOD. Applications focusing on the cardiovascular effects of obesity, e.g., LVH or end stage arterial disease may be assigned to IRG 15. Studies of the molecular bases for large vessel complications of diabetes could be assigned to CADO or IPOD.

- IRG 17 (Musculoskeletal, Oral and Skin Sciences IRG): Applications dealing with exercise may be an area of shared interest with IRG 17. If the application primarily deals with the effects of exercise on the treatment, prevention or consequences of obesity and diabetes or insulin action, it could be assigned to IPOD. Applications dealing primarily with the effects of exercise on muscle function may be assigned to IRG 17.

- IRG 18 (Digestive Sciences IRG): Applications focusing on GI hormones may be an area of shared interest with IRG 18. Applications that focus on gut mediated effects on feeding, satiety, energy expenditure and islet hormone secretion could be assigned to IPOD or CADO.

- IRG 22 (Molecular, Cellular and Developmental Neuroscience IRG): Applications using hypothalamic neuroanatomy, neurochemistry and neurophysiology to examine metabolic homeostasis are areas of shared interest with IRG 22 and could be assigned to IPOD or CADO when the focus is primarily on cellular or systemic metabolic phenotypes.

INTEGRATIVE NUTRITION AND METABOLIC PROCESSES (INMP) STUDY SECTION

The Integrative Nutrition and Metabolic Processes study section addresses research applications dealing with the integration of molecular events, gene responses, metabolic processes, and physiological functions that pertain to macronutrients (carbohydrate, fat and protein), micronutrients (vitamins and minerals), and other food components. Complications of these processes, especially diabetes, and their influence on disease are also addressed. Approaches span basic to patient-oriented research using cell culture systems, genetically manipulated animals, and human studies.

Specific areas covered by INMP include:

- Protein Metabolism: Human, animal, and cellular studies of proteins, amino acids, and their metabolites regarding the mechanisms of their synthesis, utilization, and degradation, metabolism and the inter-organ flux of these components
- Lipid Metabolism: The role of cholesterol, phospholipids, and fatty acid metabolism in physiological and pathophysiological processes, including gene regulation. Studies may span the range from cellular, genetically manipulated animals, and humans including patient-oriented research
- Lipoprotein Metabolism: The biogenesis and catabolism of lipoprotein particles, the transfer of lipids among particles, and the role of lipoproteins in health and disease
- Intermediary Metabolism: The flow of substrates through metabolic pathways, regulation of the metabolic processes, and identification of new pathways involving nutrients and other food components. Substrate turnover and flux of carbohydrates,

amino acids, lipids, fatty acids, vitamins, and minerals may be investigated in health and disease states other than diabetes and obesity. In vitro, or compartmental models may be used as well as in vivo approaches

- Vitamin Metabolism: Studies ranging from cellular through human investigations of vitamin requirements, utilization, metabolism, and function including investigations involving genomics such as genotype-phenotype relationships of vitamin metabolism. Specifically, the role of vitamins as modifiers of the functions in specialized cells could be addressed by INMP. Dose response studies should be conducted over a wide range from deficient to excessive. The relationship of vitamin metabolism and function in neurochemistry, brain dysfunction and cognition may also be relevant.
- Mineral Metabolism: Cellular, animal, and human studies dealing with the absorption, transport, metabolism, and function of macro and trace elements as influenced by nutrient intake. Approaches could include use of genetically manipulated animals, genomics, and human subjects of specific genotypes. Studies of the specific function of minerals on various tissues and physiological functions are included, such as the role of metals in neurochemistry and cognition, the acute phase response, immune function, and cellular development. The effect of minerals on cellular, metabolic, and physiological functions should be studied using a wide range of levels from deficient to excessive.
- Other Food Components: The cellular, metabolic, and functional effects of other components in the food supply that influence health and disease in humans. This includes studies of the role of carotenoids, flavonoids, and other phytonutrients on metabolic processes, cellular function, and gene expression. Studies could be conducted over a range of physiological intakes ranging from very low to high.
- Nutrients, Differentiation, and Neoplasia: Human, animal, and cell studies of the effect of nutrients and other food components on cellular differentiation and normal and abnormal proliferation. Studies of underlying mechanisms as well as the effects on nutrient metabolism and function may be addressed. The role of nutrients and food components should be determined over a wide range of intakes.
- Inborn Errors of Metabolism: The molecular mechanisms underlying inherited disorders of metabolism involving amino acids, carbohydrates, fatty acids, vitamins, and minerals may be included
- Oxidative Stress and Antioxidants: The effect of nutrients, other food components, and metabolic substrates on the generation of reactive oxygen and nitrogen species and their effects on disease processes will be studied. The contribution of specific nutrients and other food components to antioxidant defenses is included
- Diabetes Complications: Macrovascular and microvascular complications of diabetes including cardiovascular disease, retinopathy, nephropathy, and neuropathy. The underlying mechanisms, genetic predictors, and the role of diet in prevention of diabetic complications will be included

Shared Interests Within the IRG:

- Cellular Aspect of Diabetes and Obesity (CADO) and Integrative Physiology of Obesity and Diabetes (IPOD): There is shared interest with CADO and IPOD, particularly as related to lipids and lipoproteins, the metabolism of which frequently are disturbed in both diabetes and the metabolic syndrome/central obesity. Moreover, nutritional approaches are central to the management of both diabetes and obesity. The complications of diabetes, may be dealt with in this study section where needed but, obviously, this area is of paramount interest to the diabetes and obesity study sections. The INMP study section may review in vivo aspects of protein and lipid metabolism, while IPOD may review in vivo aspects of carbohydrate metabolism. These distinctions are somewhat arbitrary, since the metabolism of these 3 substrates clearly is closely inter-

related. Applications dealing with energy intake, satiety, energy expenditure, physical activity and exercise, and energy balance may be assigned to IPOD. INMP could be assigned studies of the effects of micronutrient metabolism in obese and diabetic populations.

- Pregnancy, Neonatology and Lactation (PNL): Studies of the effect of pregnancy and reproductive hormones on nutrient metabolism will be assigned to INMP. Abnormities of fuel metabolism, such as gestational diabetes, will be assigned to IPOD. Studies evaluating the impact of diet on pregnancy and lactation outcomes will be assigned to PNL.

- Molecular and Cellular Endocrinology (MCE): INMP will review studies of the effect of hormones on nutrient metabolism. This would include studies of the underlying effect of hormones on nutrient metabolism at a cellular level, their role in integrating the metabolism of nutrients and food components at the organismal levels, and the consequences of inadequate or excessive nutrient supplies on hormone actions. Studies of the mechanism of hormone action on nutrient metabolism other than glucose metabolism may be assigned to MCE or INMP depending on the particular focus of the application.

Shared Interests Outside of the IRG:

- IRG 2 (Molecular Approaches to Gene Function IRG): Applications that specifically address the role of nutrients directly or indirectly on gene expression could be assigned to INMP.

- IRG 3 (Molecular Approaches to Cell Function and Interactions IRG): Applications that specifically address directly or indirectly the role of nutrients on cell function and interactions could be assigned to INMP.

- IRG 5 (Biology of Development and Aging): Applications whose main focus is on underlying mechanisms of aging involving nutritional or metabolic factors, such as oxidative stress or use of antioxidants to delay aging processes, or focus on the role of nutritional or metabolic factors in clinical, physiologic, or pathophysiologic age-related changes, could be assigned to IRG 5 when the study transcends single organ systems or disciplines.

- IRG 7 (Health of the Population IRG): Studies of dietary selection behavior and food patterns may be assigned to IRG 7. INMP may be assigned the metabolic consequences of dietary behaviors.

- IRG 15 (Cardiovascular Sciences IRG): There is shared interest in the area of lipids and lipoproteins as related to atherosclerosis. IRG 15 could be assigned applications that focus on the interaction of lipoproteins with components of the arterial wall, whereas those that focus more on lipid and lipoprotein metabolism where atherosclerosis is not the primary focus may be assigned to INMP. Similarly, applications related to the macrovascular complications of diabetes that focus on diabetes-induced metabolic abnormalities could be assigned to INMP, IPOD or CADO, depending on the focus of the application.

- IRG 17 (Musculoskeletal, Oral and Skin Sciences IRG): The effects of nutrients and other food components on bone disease may be assigned to INMP. INMP also may be

assigned applications that focus on the role of nutrients and other food components in maintaining bone, oral and skin function and health.

- IRG 18 (Digestive Sciences IRG): Applications that focus on the role of nutrients and food components on the mechanisms of absorption and metabolism may be assigned to INMP. INMP may also be assigned applications that focus on the molecular aspects of nutrient transport and excretion. The disposition of nutrients once absorbed and their subsequent metabolism may be assigned to INMP. Dietary and physiological influences on the handling of nutrients by the gastrointestinal tract may be assigned to IRG 18. The metabolism and effects of other food components, i.e., xenobiotics, and excessive or supra-physiological doses of nutrients could be assigned to INMP.

- IRG 20 (Renal and Urological Sciences IRG): Applications that focus on the effects of nutrient metabolism in diabetic nephropathy and diabetes induced metabolic abnormalities may be assigned to INMP. IRG 20 could be assigned applications on the renal transport mechanisms intrinsic to diabetic nephropathy.

- IRG 22 (Molecular, Cellular and Developmental Neuroscience IRG): Applications that focus on the effects of nutrient metabolism in diabetic retinopathy and diabetes-induced metabolic abnormalities may be assigned to INMP. IRG 22 could be assigned studies dealing with angiogenesis and the neurobiology of diabetic retinopathy.

- IRG 24 (Brain Disorders and Clinical Neuroscience IRG): Applications that focus on the effects of nutrient metabolism in diabetic neuropathy and diabetes induced metabolic abnormalities may be assigned to INMP.